



## New Jersey Department of Health and Senior Services

# HAZARDOUS SUBSTANCE FACT SHEET

Common Name: **URANIUM**

CAS Number: 7440-61-1  
DOT Number: UN 2979

RTK Substance number: 1969  
Date: December 2001

### HAZARD SUMMARY

- \* **Uranium** emits radioactive particles which can be breathed in, swallowed or can penetrate the skin.
- \* **Uranium** is a **CARCINOGEN--HANDLE WITH EXTREME CAUTION**.
- \* **Uranium** can irritate the skin and cause a skin rash.
- \* Breathing **Uranium** can irritate the lungs causing coughing and/or shortness of breath.
- \* **Uranium** can damage the kidneys, the liver, and the blood cells (anemia).
- \* Repeated exposure can cause permanent scarring of the lungs (pneumoconiosis).
- \* **Uranium powder** is **FLAMMABLE** and a **FIRE HAZARD**.
- \* **Uranium** is a radioactive isotope and is regulated by the Nuclear Regulatory Commission (NRC). Refer to the NRC Standard 10 CFR 20.

### IDENTIFICATION

**Uranium** is a silver-white solid. It is used in nuclear power reactors, nuclear weapons, x-rays, ceramics, glass and photography.

### REASON FOR CITATION

- \* **Uranium** is on the Hazardous Substance List because it is regulated by OSHA and is cited by ACGIH, DOT, NIOSH, and HHAG.
- \* This chemical is on the Special Health Hazard Substance List because it is a **CARCINOGEN**.
- \* Definitions are provided on page 5.

### HOW TO DETERMINE IF YOU ARE BEING EXPOSED

The New Jersey Right to Know Act requires most employers to label chemicals in the workplace and requires public employers to provide their employees with information and training concerning chemical hazards and controls. The federal OSHA Hazard Communication Standard, 1910.1200, requires private employers to provide similar training and information to their employees.

- \* Exposure to hazardous substances should be routinely evaluated. This may include collecting personal and area air samples. You can obtain copies of sampling results from

your employer. You have a legal right to this information under OSHA 1910.1020.

- \* If you think you are experiencing any work-related health problems, see a doctor trained to recognize occupational diseases. Take this Fact Sheet with you.

### WORKPLACE EXPOSURE LIMITS

OSHA: The legal airborne permissible exposure limit (PEL) is **0.25 mg/m<sup>3</sup>** averaged over an 8-hour workshift.

NIOSH: The recommended airborne exposure limit is **0.2 mg/m<sup>3</sup>** averaged over a 10-hour workshift and **0.6 mg/m<sup>3</sup>**, not to be exceeded during any 15 minute work period.

ACGIH: The recommended airborne exposure limit is **0.2 mg/m<sup>3</sup>** averaged over an 8-hour workshift and **0.6 mg/m<sup>3</sup>** as a STEL (short-term exposure limit).

- \* **Uranium** is a **CARCINOGEN** in humans. There may be no safe level of exposure to a carcinogen, so all contact should be reduced to the lowest possible level.
- \* The above exposure limits are for air levels only. When skin contact also occurs, you may be overexposed, even though air levels are less than the limits listed above.
- \* Exposure to radioactive materials is regulated by the NRC and OSHA. Refer to the NRC Standard 10 CFR 20 and the OSHA Standard 29 CFR 1910.96.

### WAYS OF REDUCING EXPOSURE

- \* Enclose operations and use local exhaust ventilation at the site of chemical release. If local exhaust ventilation or enclosure is not used, respirators should be worn.
- \* A regulated, marked area should be established where **Uranium** is handled, used, or stored.
- \* Wear protective work clothing.
- \* Wash thoroughly immediately after exposure to **Uranium** and at the end of the workshift
- \* Post hazard and warning information in the work area. In addition, as part of an ongoing education and training effort, communicate all information on the health and safety hazards of **Uranium** to potentially exposed workers.

This Fact Sheet is a summary source of information of all potential and most severe health hazards that may result from exposure. Duration of exposure, concentration of the substance and other factors will affect your susceptibility to any of the potential effects described below.

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## HEALTH HAZARD INFORMATION

### Acute Health Effects

The following acute (short-term) health effects may occur immediately or shortly after exposure to **Uranium**:

- \* **Uranium** can irritate the skin and cause a skin rash.
- \* Breathing **Uranium** can irritate the lungs causing coughing and/or shortness of breath.

### Chronic Health Effects

The following chronic (long-term) health effects can occur at some time after exposure to **Uranium** and can last for months or years:

### Cancer Hazard

- \* **Uranium** is a CARCINOGEN in humans. It has been shown to cause lung, larynx and bone cancers.
- \* Many scientists believe there is no safe level of exposure to a carcinogen. Such substances may also have the potential for causing reproductive damage in humans.

### Reproductive Hazard

- \* Because **Uranium** gives off very dangerous radiation, it has the potential for causing reproductive damage in humans.

### Other Long-Term Effects

- \* **Uranium** can damage the kidneys, the liver, and the blood cells (anemia).
- \* Repeated exposure can cause permanent scarring of the lungs (pneumoconiosis).

## MEDICAL

### Medical Testing

Before beginning employment and at regular times after that, the following is recommended:

- \* Chest x-ray.

If symptoms develop or overexposure is suspected, the following are recommended:

- \* Lung function tests.
- \* Liver and kidney function tests.
- \* Complete blood count.

Any evaluation should include a careful history of past and present symptoms with an exam. Medical tests that look for damage already done are not a substitute for controlling exposure.

Request copies of your medical testing. You have a legal right to this information under OSHA 1910.1020.

### Mixed Exposures

- \* Because smoking can cause heart disease, as well as lung cancer, emphysema, and other respiratory problems, it may worsen respiratory conditions caused by chemical exposure. Even if you have smoked for a long time, stopping now will reduce your risk of developing health problems.
- \* Because more than light alcohol consumption can cause liver damage, drinking alcohol may increase the liver damage caused by **Uranium**.

## WORKPLACE CONTROLS AND PRACTICES

Unless a less toxic chemical can be substituted for a hazardous substance, **ENGINEERING CONTROLS** are the most effective way of reducing exposure. The best protection is to enclose operations and/or provide local exhaust ventilation at the site of chemical release. Isolating operations can also reduce exposure. Using respirators or protective equipment is less effective than the controls mentioned above, but is sometimes necessary.

In evaluating the controls present in your workplace, consider: (1) how hazardous the substance is, (2) how much of the substance is released into the workplace and (3) whether harmful skin or eye contact could occur. Special controls should be in place for highly toxic chemicals or when significant skin, eye, or breathing exposures are possible.

In addition, the following controls are recommended:

- \* Where possible, automatically transfer **Uranium** from drums or other storage containers to process containers.
- \* A Class I, Type B, biological safety hood should be used when mixing, handling, or preparing **Uranium**.
- \* Before entering a confined space where **Uranium powder** may be present, check to make sure that an explosive concentration does not exist.

Good **WORK PRACTICES** can help to reduce hazardous exposures. The following work practices are recommended:

- \* Workers whose clothing has been contaminated by **Uranium** should change into clean clothing promptly.
- \* Do not take contaminated work clothes home. Family members could be exposed.
- \* Contaminated work clothes should be laundered by individuals who have been informed of the hazards of exposure to **Uranium**.

- \* Eye wash fountains should be provided in the immediate work area for emergency use.
- \* If there is the possibility of skin exposure, emergency shower facilities should be provided.
- \* On skin contact with **Uranium**, immediately wash or shower to remove the chemical. At the end of the workshift, wash any areas of the body that may have contacted **Uranium**, whether or not known skin contact has occurred.
- \* Do not eat, smoke, or drink where **Uranium** is handled, processed, or stored, since the chemical can be swallowed. Wash hands carefully before eating, drinking, applying cosmetics, smoking, or using the toilet.
- \* Use a vacuum or a wet method to reduce dust during clean-up. DO NOT DRY SWEEP.
- \* When vacuuming, a high efficiency particulate air (HEPA) filter should be used, not a standard shop vacuum.
- \* Employees exposed to ionizing radiation should be provided with personal monitoring equipment such as film badges or pocket dosimeters.

## PERSONAL PROTECTIVE EQUIPMENT

WORKPLACE CONTROLS ARE BETTER THAN PERSONAL PROTECTIVE EQUIPMENT. However, for some jobs (such as outside work, confined space entry, jobs done only once in a while, or jobs done while workplace controls are being installed), personal protective equipment may be appropriate.

OSHA 1910.132 requires employers to determine the appropriate personal protective equipment for each hazard and to train employees on how and when to use protective equipment.

The following recommendations are only guidelines and may not apply to every situation.

### Clothing

- \* Avoid skin contact with **Uranium**. Wear protective gloves and clothing. Safety equipment suppliers/manufacturers can provide recommendations on the most protective glove/clothing material for your operation.
- \* All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.

### Eye Protection

- \* Wear eye protection with side shields or goggles.
- \* Wear a face shield along with goggles when working with corrosive, highly irritating or toxic substances.

### Respiratory Protection

**IMPROPER USE OF RESPIRATORS IS DANGEROUS.** Such equipment should only be used if the employer has a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing and medical exams, as described in OSHA 1910.134.

- \* Where the potential exists for exposure over **0.2 mg/m<sup>3</sup>**, use a NIOSH approved supplied-air respirator with a full facepiece operated in a pressure-demand or other positive-pressure mode. For increased protection use in combination with an auxiliary self-contained breathing apparatus operated in a pressure-demand or other positive-pressure mode.
- \* Exposure to **10 mg/m<sup>3</sup>** is immediately dangerous to life and health. If the possibility of exposure above **10 mg/m<sup>3</sup>** exists, use a NIOSH approved self-contained breathing apparatus with a full facepiece operated in a pressure-demand or other positive-pressure mode.

## HANDLING AND STORAGE

- \* Prior to working with **Uranium** you should be trained on its proper handling and storage.
- \* A regulated, marked area should be established where **Uranium** is handled, used, or stored.
- \* **Uranium powders** and/or *dusts* can react with WATER or MOIST AIR resulting in a fire.
- \* **Uranium** must be stored to avoid contact with CARBON DIOXIDE; NITRIC ACID; MOIST AIR; CARBON TETRACHLORIDE; BORON TRIFLUORIDE; SELENIUM; SULFURS; and OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE) since violent reactions occur.
- \* Store in tightly closed containers in a cool, well-ventilated area.
- \* Sources of ignition, such as smoking and open flames, are prohibited where **Uranium powder** is used, handled, or stored.
- \* Metal containers involving the transfer of **Uranium powder** should be grounded and bonded.
- \* Use only non-sparking tools and equipment, especially when opening and closing containers of **Uranium powder**.

## QUESTIONS AND ANSWERS

- Q: If I have acute health effects, will I later get chronic health effects?
- A: Not always. Most chronic (long-term) effects result from repeated exposures to a chemical.
- Q: Can I get long-term effects without ever having short-term effects?
- A: Yes, because long-term effects can occur from repeated exposures to a chemical at levels not high enough to make you immediately sick.
- Q: What are my chances of getting sick when I have been exposed to chemicals?
- A: The likelihood of becoming sick from chemicals is increased as the amount of exposure increases. This is determined by the length of time and the amount of material to which someone is exposed.

Q: When are higher exposures more likely?

A: Conditions which increase risk of exposure include dust releasing operations (grinding, mixing, blasting, dumping, etc.), other physical and mechanical processes (heating, pouring, spraying, spills and evaporation from large surface areas such as open containers), and "confined space" exposures (working inside vats, reactors, boilers, small rooms, etc.).

Q: Is the risk of getting sick higher for workers than for community residents?

A: Yes. Exposures in the community, except possibly in cases of fires or spills, are usually much lower than those found in the workplace. However, people in the community may be exposed to contaminated water as well as to chemicals in the air over long periods. This may be a problem for children or people who are already ill.

Q: Can men as well as women be affected by chemicals that cause reproductive system damage?

A: Yes. Some chemicals reduce potency or fertility in both men and women. Some damage sperm and eggs, possibly leading to birth defects.

Q: Who is at the greatest risk from reproductive hazards?

A: Pregnant women are at greatest risk from chemicals that harm the developing fetus. However, chemicals may affect the ability to have children, so both men and women of childbearing age are at high risk.

Q: What acute health effects will I get from radiation exposure?

A: Exposure over a short period of time to high doses of ionizing radiation (500 rads) can cause severe tissue necrosis and death.

Q: Can I get long-term effects without even having short-term effects?

A: Yes. The long-term effect of acute radiation exposure includes an increased risk of cancer.

Q: What are my chances of getting sick when I have been exposed to radioactive chemicals?

A: The likelihood of becoming sick from radioactive chemicals increases as the amount of exposure increases. This is determined by the length of time and the amount of radiation to which someone is exposed.

Q: When are higher exposures more likely?

A: Higher radiation exposures are limited to workers in the nuclear industry but could become a major hazard to the population immediately affected by a major nuclear disaster.

Q: Do all radioactive chemicals cause cancer?

A: Yes. Ionizing radiation is carcinogenic to all tissues under appropriate conditions.

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The following information is available from:

New Jersey Department of Health and Senior Services  
Occupational Health Service  
PO Box 360  
Trenton, NJ 08625-0360  
(609) 984-1863  
(609) 984-7407 (fax)

Web address: <http://www.state.nj.us/health/eoh/odisweb/>

### **Industrial Hygiene Information**

Industrial hygienists are available to answer your questions regarding the control of chemical exposures using exhaust ventilation, special work practices, good housekeeping, good hygiene practices, and personal protective equipment including respirators. In addition, they can help to interpret the results of industrial hygiene survey data.

### **Medical Evaluation**

If you think you are becoming sick because of exposure to chemicals at your workplace, you may call personnel at the Department of Health and Senior Services, Occupational Health Service, who can help you find the information you need.

### **Public Presentations**

Presentations and educational programs on occupational health or the Right to Know Act can be organized for labor unions, trade associations and other groups.

### **Right to Know Information Resources**

The Right to Know Infoline (609) 984-2202 can answer questions about the identity and potential health effects of chemicals, list of educational materials in occupational health, references used to prepare the Fact Sheets, preparation of the Right to Know Survey, education and training programs, labeling requirements, and general information regarding the Right to Know Act. Violations of the law should be reported to (609) 984-2202.

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## DEFINITIONS

**ACGIH** is the American Conference of Governmental Industrial Hygienists. It recommends upper limits (called TLVs) for exposure to workplace chemicals.

A **carcinogen** is a substance that causes cancer.

The **CAS number** is assigned by the Chemical Abstracts Service to identify a specific chemical.

A **combustible** substance is a solid, liquid or gas that will burn.

A **corrosive** substance is a gas, liquid or solid that causes irreversible damage to human tissue or containers.

**DEP** is the New Jersey Department of Environmental Protection.

**DOT** is the Department of Transportation, the federal agency that regulates the transportation of chemicals.

**EPA** is the Environmental Protection Agency, the federal agency responsible for regulating environmental hazards.

A **fetus** is an unborn human or animal.

A **flammable** substance is a solid, liquid, vapor or gas that will ignite easily and burn rapidly.

The **flash point** is the temperature at which a liquid or solid gives off vapor that can form a flammable mixture with air.

**HHAG** is the Human Health Assessment Group of the federal EPA.

**IARC** is the International Agency for Research on Cancer, a scientific group that classifies chemicals according to their cancer-causing potential.

A **miscible** substance is a liquid or gas that will evenly dissolve in another.

**mg/m<sup>3</sup>** means milligrams of a chemical in a cubic meter of air. It is a measure of concentration (weight/volume).

A **mutagen** is a substance that causes mutations. A **mutation** is a change in the genetic material in a body cell. Mutations can lead to birth defects, miscarriages, or cancer.

**NAERG** is the North American Emergency Response Guidebook. It was jointly developed by Transport Canada, the United States Department of Transportation and the Secretariat of Communications and Transportation of Mexico. It is a guide for first responders to quickly identify the specific or generic hazards of material involved in a transportation incident, and to protect themselves and the general public during the initial response phase of the incident.

**NCI** is the National Cancer Institute, a federal agency that determines the cancer-causing potential of chemicals.

**NFPA** is the National Fire Protection Association. It classifies substances according to their fire and explosion hazard.

**NIOSH** is the National Institute for Occupational Safety and Health. It tests equipment, evaluates and approves respirators, conducts studies of workplace hazards, and proposes standards to OSHA.

**NTP** is the National Toxicology Program which tests chemicals and reviews evidence for cancer.

**OSHA** is the Occupational Safety and Health Administration, which adopts and enforces health and safety standards.

**PEL** is the Permissible Exposure Limit which is enforceable by the Occupational Safety and Health Administration.

**PIH** is a DOT designation for chemicals which are Poison Inhalation Hazards.

**ppm** means parts of a substance per million parts of air. It is a measure of concentration by volume in air.

A **reactive** substance is a solid, liquid or gas that releases energy under certain conditions.

A **teratogen** is a substance that causes birth defects by damaging the fetus.

**TLV** is the Threshold Limit Value, the workplace exposure limit recommended by ACGIH.

The **vapor pressure** is a measure of how readily a liquid or a solid mixes with air at its surface. A higher vapor pressure indicates a higher concentration of the substance in air and therefore increases the likelihood of breathing it in.

\* If employees are required to clean-up spills, they must be properly trained and equipped. OSHA 1910.120(q) may be applicable.

Hazard rating	NJDHSS	NFPA
<b>FLAMMABILITY</b>	Not Found	Not Rated
<b>REACTIVITY</b>	Not Found	Not Rated
RADIOACTIVE POWDER IGNITES SPONTANEOUSLY IN AIR DO NOT USE WATER POISONOUS GASES ARE PRODUCED IN FIRE CONTAINERS MAY EXPLODE IN FIRE		

*Hazard Rating Key: 0=minimal; 1=slight; 2=moderate; 3=serious; 4=severe*

FOR LARGE SPILLS AND FIRES immediately call your fire department. You can request emergency information from the following:

CHEMTREC: (800) 424-9300  
NJDEP HOTLINE: 1-877-WARN-DEP

## FIRST AID

**For POISON INFORMATION call 1-800-222-1222**

- \* **Uranium** powder or dust IGNITES SPONTANEOUSLY IN AIR, or when exposed to HEAT, FLAME, or MOIST AIR.
- \* If **pyrophoric Uranium** metal is involved in a fire, use graphite, soda ash, powdered *sodium chloride* or dry powder to extinguish. DO NOT USE WATER.
- \* POISONOUS GASES ARE PRODUCED IN FIRE, including *Uranium Oxide fumes*.
- \* CONTAINERS MAY EXPLODE IN FIRE.
- \* Use water spray to keep fire-exposed containers cool.
- \* If employees are expected to fight fires, they must be trained and equipped as stated in OSHA 1910.156.

- \* Immediately flush with large amounts of water for at least 15 minutes, occasionally lifting upper and lower lids.

\* Remove contaminated clothing. Wash contaminated skin with soap and water.

- \* Remove the person from exposure.
- \* Begin rescue breathing (using universal precautions) if breathing has stopped and CPR if heart action has stopped.
- \* Transfer promptly to a medical facility.

If **Uranium** is spilled, take the following steps:

**Vapor Pressure:** 0 mm Hg at 68°F (20°C)

**Water Solubility:** Insoluble

- \* Evacuate persons not wearing protective equipment from area of spill until clean-up is complete.
- \* Remove all ignition sources.
- \* Collect powdered material in the most convenient and safe manner and deposit in sealed containers.
- \* DO NOT USE WATER.
- \* Ventilate and wash area after clean-up is complete.
- \* Test for trace levels of radioactivity after clean-up.
- \* Keep **Uranium** out of a confined space, such as a sewer, because of the possibility of an explosion, unless the sewer is designed to prevent the build-up of explosive concentrations.
- \* It may be necessary to contain and dispose of **Uranium** as HAZARDOUS RADIOACTIVE WASTE. Contact your state Department of Environmental Protection (DEP), the Nuclear Regulatory Commission (NRC), or your regional office of the federal Environmental Protection Agency (EPA) for specific recommendations.

**Chemical Name:**

Uranium

*Not intended to be copied and sold for commercial purposes.*

NEW JERSEY DEPARTMENT OF HEALTH AND  
SENIOR SERVICES

## Right to Know Program

PO Box 368, Trenton, NJ 08625-0368  
(609) 984-2202